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# Report To The Chairman, Subcommittee On Investigations Committee On Armed Services House Of Representatives

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# The Army's Program To Assure The Security And Safety Of The Chemical Munitions Stockpile Is Comprehensive And Effective

The United States has a large stockpile of toxic chemical munitions to deter other countries from using chemical warfare and to retaliate if deterrence is unsuccessful. The potential health and safety concerns about these munitions and the psychological, political, and military implications of the accidental or uncontrolled release of chemical agents require rigid and precise controls. The Army has established a Chemical Surety Program to assure that chemical agents and their related weapons systems are maintained in a manner which enhances safety, security, and reliability.

GAO found that chemical munitions storage sites have, and are adhering to, an effective Chemical Surety Program. The report also discusses past and planned actions concerning the demilitarization of chemical munitions.

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B-211808

The Honorable Bill Nichols
Chairman, Subcommittee on
Investigations
Committee on Armed Services
House of Representatives

Dear Mr. Chairman:

During hearings held by your Subcommittee in the 97th Congress on the physical security of military installations, Representative Larry Hopkins asked us to examine the storage of chemical munitions within the United States. Your February 4, 1983, letter asked that our work, as previously defined by Mr. Hopkins, be performed for the Subcommittee on Investigations.

As requested, our review focused on the security aspects of the chemical munitions stockpile, safety of the stored munitions, and the demilitarization process as it affects chemical munitions. We were primarily concerned with the effectiveness of the Department of the Army's efforts to assure that chemical munitions and agents are stored and secured in such a way as to pose no undue hazard to the safety of people or the environment.

We are sending copies of this report to the Chairmen, House Committees on Appropriations, on Armed Services, and on Government Operations and Senate Committees on Appropriations, on Armed Services, and on Governmental Affairs; the Director, Office of Management and Budget; and the Secretaries of Defense and the Army. Copies will be made available to other interested parties upon request.

Sincerely yours,

Frank C. Conahan

Frank C. Conahan
Director

GENERAL ACCOUNTING OFFICE
REPORT TO THE CHAIRMAN,
SUBCOMMITTEE ON INVESTIGATIONS,
COMMITTEE ON ARMED SERVICES,
HOUSE OF REPRESENTATIVES

# THE ARMY'S PROGRAM TO ASSURE THE SECURITY AND SAFETY OF THE CHEMICAL MUNITIONS STOCKPILE IS COMPREHENSIVE AND EFFECTIVE

## D I G E S T

At the request of the Chairman, Subcommittee on Investigations, House Committee on Armed Services, GAO reviewed the Department of the Army's programs to securely and safely maintain the toxic chemical munitions and bulk chemical agent stockpile within the United States. GAO was primarily interested in the effectiveness of the Army's efforts to prevent undue hazard to people and the environment; identifying barriers to accomplishing these objectives; and past actions, current projects, and future plans for demilitarization.

The United States maintains a large stockpile of toxic chemical munitions and bulk chemical agents to help deter other nations from resorting to chemical warfare and to possibly retaliate should deterrence not succeed. Most of this toxic stockpile is at eight storage sites in the United States and is in the custody of the Army. (See p. 1.)

## CHEMICAL SURETY PROGRAM

The Army established this program in January 1977 to assure that all toxic chemical agents and related munitions in its custody are maintained in a manner that enhances safety, security, and reliability. The rigid and precise controls stem not only from the toxic and potentially lethal nature of the stockpile, but also from the psychological, political, and military implications of the possible accidental or uncontrolled release of a chemical agent. (See p. 4.)

Security efforts related to chemical storage appeared to comply with regulations except for two areas. These concerned training of the Augmentation Reserve Force and perimeter alarm systems. Achieving this compliance has cost

millions of dollars for improvements and upgrade projects since 1976, and additional millions are spent annually maintaining compliance. We could not obtain precise figures, however. (See p. 2.)

Typically, each site provides multiple layers of protection to prevent unauthorized access. The storage area is well defined by two chain-link fences topped with barbed wire, and at night the perimeter is well lighted. (See p. 5.)

Toxic material is stored in standard bunker-type ammunition magazines with heavy-duty steel doors secured with two high-security locks. A 2-1/2-ton concrete block, set on a 12-inch-high steel pin, blocks the door and requires a heavy-duty forklift to move it. Each bunker is further equipped with intrusion detection sensors (electronic alarms). Storage areas are patrolled around the clock, and reinforcements are available in minutes. (See p. 5.)

Personnel and vehicles must be cleared through a guard-controlled entrance facility before entering or leaving a chemical storage area. Individuals that require regular access to a chemical storage area must have an appropriate security clearance and be enrolled and qualified through a personnel reliability program. (See p. 6.)

None of the storage sites yet has an operational perimeter alarm system. Army officials, however, are developing a concept through which this requirement is to be met. Also, the sites are not conducting annual training exercises with the entire Augmentation Reserve Force--a security force in addition to the storage sites' fast response forces--as currently prescribed by regulation. However, the regulation prescribing this requirement is being changed to officially authorize the alternative procedures currently used. (See pp. 6 and 7.)

The safety program is a comprehensive plan with stringent guidelines governing chemical storage and operations. Inspection, reinspection, and monitoring assure that safety procedures are being followed to prevent chemical accidents or incidents. Chemical accidents differ from chemical incidents primarily on the basis of the extent of "damage." (See app. II for the specific criteria for differentiating between an accident and an incident.) Should a chemical accident or incident occur, each site has a

a detailed plan for controlling the situation. This includes agreements with civilian law enforcement and health authorities for evacuation and treatment of local residents, if necessary. (See p. 8.)

All surety program components are frequently inspected, tested, and evaluated. At least every 18 months, Army Materiel Development and Readiness Command personnel conduct surety operational inspections. (See p. 9.)

Army efforts have been successful. For at least the last 5 years (1978-82), the extent of chemical accidents and incidents has been minimal. GAO visited four storage sites which, together, store the vast majority of the stockpile and found that three had experienced a total of only five minor chemical accidents or incidents for the 5-year period. The other site had experienced none. All the accidents or incidents were immediately and thoroughly investigated, and none led to serious personal injury. All chemical agent contamination was restricted, with no release to the outside atmosphere. Moreover, four of these cases were associated with demilitarization or disposal operations rather than normal storage and maintenance. (See p. 10.)

GAO found the Army's program to assure the security and safety of the chemical munitions stockpile to be comprehensive and effective. The chemical storage sites reviewed appeared to be complying with program requirements, except in the two areas discussed previously.

## DEMILITARIZATION AND DISPOSAL

As of November 1982, more than 750,000 toxic munitions were earmarked for immediate demilitarization (rendering them useless for military purposes), including over 600 leaking munitions that are safely containerized. Eventually, all chemical munitions will require disposal since they have finite, though not specifically defined, shelf lives. Disposal methods, however, are restricted by law because of the potential impact of the toxic agents on public health and the environment. Current estimates indicate that disposing of the entire existing stockpile would cost as much as $2 billion, over a 20-year period. (See p. 13.)



Tear Sheet

Between 1972 and April 1983, the Army demilitarized over 14 million pounds of toxic chemicals.

Current demilitarization systems are limited in size and production rates and, therefore, are not suitable for large-scale disposal. According to Defense officials, the current systems do, however, provide valuable data for testing and improving existing processes that could ultimately be used for a large-scale demilitarization system. (See p. 15.)

OTHER MATTERS

Information on various other subjects related to security and safety of toxic chemical munitions and bulk agents was obtained from Army officials and is included in this report. These subjects include

--rationale for current chemical munitions storage locations,

--barriers to storage consolidation,

--plans for moving chemical munitions, and

--feasibility of contracting out for security guards. (See pp. 21 to 24.)

We did not obtain formal agency comments on this report but did discuss our findings with Army officials. Their views are included in the report where appropriate.

# Contents



## ABBREVIATIONS

| | |
|---|---|
| CAMDS | Chemical Agent Munitions Disposal System |
| DARCOM | Department of the Army Materiel Development and Readiness Command |
| DATS | Drill and Transfer System |
| demil | demilitarization |
| GAO | General Accounting Office |
| JACADS | Johnston Atoll Chemical Agent Disposal System |
| RMA | Rocky Mountain Arsenal |
| RDT&E | research, development, test, and evaluation |
| USATHAMA | United States Army Toxic and Hazardous Materials Agency |

# CHAPTER 1

## INTRODUCTION

The United States has a large stockpile of toxic chemical munitions and bulk agents to deter another country from using chemical warfare and to retaliate if deterrence is unsuccessful. The stockpile consists of various munitions and containers filled with these chemicals. These agents, known as mustard, GB, VX, and BZ, are described in appendix I. The majority of these chemical munitions and agents are at eight storage sites in the United States. These are Tooele Army Depot, Utah; Pueblo Depot Activity, Colorado; Pine Bluff Arsenal, Arkansas; Lexington-Blue Grass Depot Activity, Kentucky; Aberdeen Proving Ground, Maryland; Anniston Army Depot, Alabama; Newport Army Ammunition Plant, Indiana; and Umatilla Depot Activity, Oregon. Specific data on the amounts and types of munitions and agents at these locations is classified.

The potential lethality of chemical agents and munitions and the current safety, psychological, political, and military implications of the release of chemical agents in the public domain require rigid and precise controls. To accomplish these ends, the Army has established a Chemical Surety Program to assure that all toxic chemical agents and their related weapons systems are maintained in a manner which enhances safety, security, and reliability.

## COST OF CHEMICAL WEAPONS STORAGE

According to officials in the Nuclear/Chemical Directorate, Headquarters, Department of the Army, the various cost elements related to chemical weapons storage are not routinely maintained in a consolidated form and, therefore, are not easily obtainable. The data presented below was developed for a particular Army need at a particular time. We are presenting this as "the latest data available" and because of time constraints and the amount of effort necessary, we did not ask the Army to update it.

The following information reflects the total cost figures for each category at the eight U.S. chemical munitions storage sites.

Cost Related to Toxic Chemical Program
(Fiscal Years 1976-81)

| Cost category | Amount (millions) |
|---|---|
| Security | $108.7 |
| Surety | 7.0 |
| Inventory control | 19.1 |
| Rewarehousing | 4.7 |
| 1-ton-container weighing | 5.7 |
| Surveillance | 22.8 |
| Protective clothing and equipment | 4.3 |
| Detection and monitoring equipment | 3.7 |
| Training | 2.6 |
| Containment and disposal of "leakers" | 2.1 |
| Total | $180.7 |

Each of these cost categories is made up of numerous components. However, we were told that a detailed breakdown is not available and would be costly and time consuming to prepare. The figures reflect "a level of effort" showing that chemical weapons storage is expensive.

## OBJECTIVES, SCOPE, AND METHODOLOGY

Our objectives were to:

--Determine the effectiveness of the Army's efforts to assure that chemical munitions and agents are stored and secured in such a way as to pose no undue hazard to the safety of people or to the environment.

--Determine the extent to which the storage sites we reviewed have, and are adhering to, an effective chemical surety program.

--Obtain information on plans and past actions of the Departments of Defense and the Army concerning the demilitarization of chemical munitions.

We contacted officials at Headquarters, Department of Defense, Department of the Army, and the Department of the Army Materiel Development and Readiness Command (DARCOM). Our fieldwork was performed primarily at four of the eight continental United States storage sites--Tooele Army Depot, Pueblo Depot Activity, Pine Bluff Arsenal, and Lexington-Blue Grass Depot Activity. We selected these locations so that we could review the storage and control of a variety of chemical munitions which were stored in different geographical locations and because the munitions and bulk agents stored at these sites constitute the vast majority of those in storage in the continental United States.

Our work on demilitarization was done primarily at the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), Edgewood, Maryland.

We reviewed Army regulations and guidance establishing security and safety requirements for storing chemical agents and munitions. We reviewed storage site plans and procedures for implementing these requirements, interviewed storage site officials about security and safety programs, reviewed documents on security and safety operations, and observed selected aspects of the security and safety procedures currently in effect at the storage sites. Our work on demilitarization consisted of meeting with USATHAMA officials to discuss chemical demilitarization plans and reviewing USATHAMA's "Long Range Chemical Demilitarization Concept Study." We also visited the Chemical Agent Munitions Disposal System (CAMDS) at Tooele Army Depot.

In general, our review was limited to determining whether the storage sites had effectively implemented Army requirements for security and safety of chemical munitions and what plans there were for demilitarization. We did not assess the Army's compliance with requirements established by other agencies, such as the Occupational Safety and Health Administration. We did not try to evaluate the stated requirements for a chemical munitions stockpile or how well the current stockpile inventory is meeting those requirements. We likewise did not do any work involving the binary munitions concept. In order to keep the report unclassified, specific data related to type, quantity, locations, and condition of the munitions and agents has been omitted.

Our review was conducted in accordance with generally accepted government auditing standards except that, at the Subcommittee's request, we did not obtain formal agency coments but did discuss our findings with Army officials. Their views are included in the report where appropriate.

## CHAPTER 2

## DEPARTMENT OF THE ARMY CHEMICAL SURETY PROGRAM PROVIDES GUIDANCE FOR THE SAFETY AND SECURITY OF CHEMICAL MUNITIONS AND AGENTS

The basic regulations for chemical surety are Army Regulation 50-6, Chemical Surety Program, and Army Regulation 50-6-1, Chemical Surety Program. These regulations establish policies and prescribe procedures to provide for safety, security, and reliability of all chemical surety material in the custody of the Army. Each of the four storage sites visited has a Chemical Surety Program as prescribed in Army regulations. Over the past 5 years, these four sites have had only one "chemical accident" and four "chemical incidents." None were considered serious. In two areas, the storage sites were not complying with established chemical surety regulations. These concerned training of the Augmentation Reserve Force and perimeter instrusion detection systems.

### SECURITY AND SAFETY ARRANGEMENTS APPEAR ADEQUATE

Each storage site reviewed has established a Chemical Surety Program as required by Army regulations, and efforts to maintain chemical agents and munitions in a secure, safe environment appear consistent with regulatory requirements. Millions of dollars have been spent since 1976 improving security facilities at the chemical storage areas, and additional millions are spent annually providing guard forces and other security-related services. We could not obtain precise figures, however. Storage site personnel conduct periodic safety reviews of functions relating to chemical storage and operations. The sites have also organized a highly structured task force to control a chemical accident or incident, and they rehearse their response in frequent test exercises and unannounced inspections.

We noted only two areas where storage sites were not following the requirements of the Chemical Surety Program. These involved perimeter intrusion detection systems and annual training of the Augmentation Reserve Force. The Army has recently begun action to acquire and install exterior intrusion detection devices at storage sites and plans to eliminate its previous requirement for annual storage site training of the Augmentation Reserve Force.

## Physical security is extensive and appears effective

Extensive physical security procedures were employed at the storage sites visited. Facilities installed to control access to chemical storage areas provide multiple layers of protection. Personnel authorized access to storage areas are enrolled in a personnel reliability program, and entry to the storage area is carefully controlled. In addition, an around-the-clock guard force patrols the storage areas and rapid-reaction reinforcements are available. None of the chemical accidents or incidents discussed later involved problems with physical security.

### Security facilities

Perimeter security is the first layer of physical protection. Two chain-link fences--each 7 feet high, anchored in concrete, and topped with double-stranded barbed wire and concertina tape--define the area boundary. To allow surveillance of the perimeter, the area between the fences and an area extending 30 feet outside the outer fence and 50 feet inside the inner fence is cleared of trees, vegetation, and other obstructions. Signs posted at intervals around the perimeter identify the area as "off limits" to all persons except those specifically authorized access.

The perimeter is lighted to permit nighttime surveillance. Commercial power is backed up by an emergency generator capable of assuming full load within a few seconds. During a nighttime tour of the storage area at Pine Bluff Arsenal, we noted that the lighting system provided a clear view of the perimeter. A facilities engineer periodically measures illumination levels to assure that the lighting systems meet regulatory requirements.

Storage structure security provides a second layer of physical protection. Chemical items are stored in standard bunker-type ammunition magazines with heavy-duty steel doors. The doors are secured by two high-security locks. One set of locks is controlled by the guard force and the other by supply personnel. Doors are further secured by a 2-1/2-ton concrete "King Tut" block set on a 12-inch-high steel pin. To open a door the block must be lifted 1 foot straight off the ground to clear the pin. This requires a heavy-duty forklift that would not be readily available to unauthorized personnel in the storage area.

An electronic interior intrusion detection system (alarm) provides the final layer of physical protection. Each bunker is equipped with such a system. When the system detects an intrusion at a bunker, an alarm sounds at the guard facility in the storage area and at an additional location elsewhere on post. The alarm display boards are monitored around the clock. When an alarm sounds, guards are dispatched to investigate. The

guard force performs a circuit test of the system at the start of each shift, and tests the detection mechanism in the bunkers monthly.

Effective February 1, 1979, each chemical storage site was required to have an exterior perimeter intrusion detection system as part of its security system. None of the sites we visited had yet installed such a system. Storage site officials told us that neither the Army nor DARCOM had designated a detection system that chemical storage sites may install to meet this requirement.

In discussions with DARCOM security officials, we were informed that, despite some initial state-of-the-art questions concerning DARCOM's ability to install exterior intrusion detection systems on perimeters as large as those encountered at chemical storage sites, DARCOM has now been directed by the Army to proceed with the intrusion detection system effort using the Air Force's Base and Installation Security System of exterior sensors and closed-circuit television for perimeter security. DARCOM is developing a concept for this to be undertaken under a centralized funding and construction effort, but at the time of our review, the concept had not been fully developed or approved by Headquarters, DARCOM or Army.

Access controls

Controls over access to the storage areas appear effective. The personnel reliability program provides for screening personnel before allowing them into chemical storage areas. When an individual is assigned to a position requiring regular access to chemical storage areas, a security clearance is obtained for the individual. In addition, the individual's medical and personnel records, as well as his or her day-to-day performance, are continually reviewed to identify anything that might disqualify the person from having access to chemical agents. The storage site commander reviews this information, interviews the individual, and decides whether the individual can be considered reliable. A Chemical Surety Position Roster lists all persons cleared for the program. The commander periodically reviews and verifies this list.

At the storage areas, the guard force checks credentials as persons enter. Persons on foot enter one at a time through an electrically operated turnstile gate to a pass exchange area. Here they surrender their identification badges to a guard stationed behind a bulletproof glass window. Separate photo-identification badges for all personnel listed on the Chemical Surety Position Roster are kept at this guard's station. Persons who are properly cleared are permitted to pass through a second turnstile gate operated by the guard, receive their storage-area access badges, and enter the area. We were present at the Pine Bluff Arsenal entry facility during a guard shift change and noted that even members of the security force go through the same step-by-step process.

Vehicles entering the storage areas go through a similar process. Upon arriving at the entry facility, passengers unload from the vehicle and enter on foot. The driver proceeds into an area enclosed by dual electrically operated gates. Once between the gates, the driver proceeds to the pass-exchange window while a guard inspects the vehicle--including the glove compartment and trunk--to insure that unauthorized items are not being transported into or out of the storage area.

Security forces

The sizes and functioning of the storage area security forces intended to respond to emergencies were consistent with regulations, and the forces appeared capable of responding effectively to emergencies. Some of the security forces conduct continuous patrols within the storage area. Other forces can reinforce the assigned patrols as required. At Pine Bluff Arsenal and Tooele Army Depot, we observed the forces' reaction to simulated emergencies. Their responses were prompt.

On each guard shift, a number of two-man patrols are stationed inside the storage area. Some of the patrols are responsible for monitoring the perimeter, checking storage bunker doors, and performing other duties within a specific assigned area. Other patrols operate as general roving patrols.

Quick-reaction backup forces supplement the patrols assigned inside the storage areas. Regulations require the following response forces and maximum response times for chemical storage area patrols:

| Response forces | Response times |
|---|---|
| Security Alert Team | 5 minutes |
| Backup Alert Force | 10 minutes |
| Reserve Force | 30 minutes |

We observed guard force reactions to be timely. On one tour of the Pine Bluff Arsenal storage area, our escort radioed to the entry facility for the Security Alert Team to report to our location. The team reported, armed with M-16 rifles, within 3 minutes. On another occasion our escort initiated, unannounced, a simulated "security problem" at the entry facility in order to test the guards' response. Within 5 minutes, 10 guards armed with M-16 rifles had surrounded the facility.

In addition to the response forces mentioned above, Army Regulation 50-6-1 currently calls for another force, to be provided by the Commander, U.S. Army Forces Command, that is organized and structured to be responsive to the needs of the supported storage site. According to the regulation, this force, known as the Augmentation Reserve Force, should train

personnel at the chemical storage site at least annually since this force is not physically located at the site. We found instead that key personnel from the Augmentation Reserve Force make periodic liaison visits to the storage sites and meet with the Commander to discuss actions that would be taken if and when the force was activated. Actual onsite training of the entire force has not been conducted at some locations in several years.

According to DARCOM's security office, the decision to use liaison visits in lieu of training exercises was a question of funding and expediency and, although discussed informally with Army, had not, in fact, been specifically authorized. We were told, however, that the regulation covering this area is currently being revised in order to officially authorize these liaison visits rather than conduct annual training at the storage sites.

## Safety program is comprehensive

Safety is a primary concern of the Chemical Surety Program, as reflected by the small number of accidents/incidents reported over the last 5 years. Safety arrangements appeared to be effective and to be in accordance with regulatory requirements. Storage conditions for chemical munitions and agents complied with guidance designed to provide adequate safety and protection from natural disasters. In addition, all sites have a comprehensive plan for controlling chemical accidents, and the various organizational elements involved in the plan rehearse their responses in periodic test exercises.

### Storage safety

Storage structures generally comply with requirements prescribed to provide adequate protection from natural disasters. The arrangement of items within the storage structures likewise complies with requirements designed to avoid safety hazards. The current sites are readily accessible to firefighting, security, and other forces that would respond to a chemical accident.

The storage structures, some of which date from World War II, are mostly arch-type concrete bunkers covered with at least 2 feet of earth. A Pine Bluff Arsenal engineer who has analyzed the design told us that the detonation of a bunker full of chemical munitions would not affect adjacent bunkers. The engineer also said the bunkers would easily withstand a tornado. In fact, similar bunkers elsewhere on the arsenal are used as tornado shelters. While earthquakes have been felt at the arsenal, none have been severe enough to damage the structures or their contents. Likewise, information we obtained from the other storage sites showed little, if any, probability of a natural disaster affecting stored chemical munitions.

### Operational safety

Both storage site personnel and higher headquarters safety officials inspect activities dealing with chemical agents to

assure that operations are safe. Plans for facilities and work procedures are examined before operations begin to identify potentially unsafe conditions.

Various groups inspect operations in progress to assure that safety procedures are being followed. Storage site personnel carry out routine programs of inspecting the various functions dealing with chemical agents. Safety procedures are an important inspection subject for surety and operational inspections conducted about every 18 months by DARCOM personnel. Finally, the Department of Defense Explosive Safety Board periodically inspects safety matters related to chemical munitions. When a chemical accident or incident such as those discussed on page 10 does occur, it is thoroughly investigated to determine the cause and identify actions needed to prevent recurrence.

Chemical accident response

The storage sites have a comprehensive plan for controlling a chemical accident or incident. Each one has a chemical accident/incident control officer and a surety officer. An operations center has been set up at each site for use in directing the various elements involved in controlling a chemical accident or incident. A written plan sets forth detailed responsibilities for each element. Written agreements with area law enforcement and health authorities provide for evacuation and treatment of off-post residents if necessary. Frequent exercises test the readiness of elements that would respond to a situation and provide practice in accident control procedures.

Controlling response forces and communicating information on the situation is considered essential to effective accident control. The storage sites have each established an operations center that is the focal point for controlling response forces. Each center is equipped with radios that can tie into the networks used by local civil authorities; telephone communications equipment; and maps and charts of the storage site and surrounding area. In the event of an accident, various personnel, including the surety officer, the security officer, the public affairs officer, a hazard analyst, and various administrative aides, report to the operations center to help the site commander direct the response forces.

An extensive accident control plan defines the mission of the various organizational elements involved in the accident response, spells out actions each element will take to prepare for accident response, and assigns responsibility for actions the element will take during an emergency.

As part of their accident control plans, the storage sites have negotiated written agreements with the police departments of towns adjoining the sites, the county sheriffs' offices, the State Police, and local hospitals and health departments. These

agreements provide for the storage sites to coordinate essential planning information with the respective civil agencies and for civil agencies to furnish assistance in evacuating off-post populations that could be exposed to agent hazards and in treating agent casualties. The agreements include maps of likely off-post hazard areas and medical data on chemical agents.

The sites conduct frequent test exercises for the accident control force. The control plans provide for a full-scale exercise at least quarterly, but we were told that exercises are usually held more frequently. The plans provide that all persons having accident control duties participate in exercises unless engaged in other essential operations. We observed exercises at Pine Bluff Arsenal and Tooele Army Depot, and they appeared to be effective and realistic tests of accident control capabilities. The various teams mentioned in the accident control plan were present for the exercise, arrived with what appeared to be appropriate supplies and equipment, and seemed to be well trained for their duties.

## A FEW MINOR CHEMICAL ACCIDENTS AND INCIDENTS HAVE OCCURRED DURING THE LAST 5 YEARS

Army Regulation 50-6 distinguishes a "chemical accident" from a "chemical incident" primarily on the the basis of extent of personal injuries or property damage, whether or not chemical agent is released beyond the limits of the military installation, the amount of chemical agent released, and the extent to which work operations are interrupted. (See app. II for a detailed definition.)

To determine the extent of chemical accidents and incidents, we reviewed chemical accident and incident reports for the last 5 years (1978-82) at each storage site visited. Pine Bluff Arsenal had experienced no chemical accidents and only one incident. Tooele Army Depot had no chemical accidents but reported three incidents in 1981. Pueblo Depot Activity had not had any accidents or incidents. Lexington-Blue Grass Depot Activity had no incidents but did report an accident in 1982. Four of these cases involved demilitarization or disposal operations rather than normal storage and maintenance functions. Each accident and incident is discussed briefly below.

### Pine Bluff Arsenal

No chemical accidents were reported at the arsenal during the past 5 years; however, one incident has occurred. According to the investigative report, on January 15, 1981, an M138 BZ bomblet (a component of the M43 bomb cluster) being prepared for a detonation test was inadvertently ignited. The cause of the ignition, as determined by the investigation team, was "most likely" due to friction or impact between a plastic rod and the pyrotechnic mix inside the bomblet. A total of two M138 bomblets ignited and agent BZ was released within the igloo

where the operation was being performed. There was no agent release to the outside atmosphere. Damage was negligible. Four people were inside the igloo at the time. They were taken to the arsenal's health clinic for observation. The clinic confirmed that these people had not been exposed to agent BZ and thus released them.

Tooele Army Depot

No chemical accidents were reported at the depot during the past 5 years, but three incidents occurred in 1981.

On April 24, 1981, an employee wearing chemical protective clothing evidently became exposed to GB nerve agent while cleaning equipment. Before the cleaning operation, personnel had modified a device that is used to control chemical agent flow and to purge and decontaminate test equipment. The modification did not conform to the original plans, and the worker failed to notice unconnected lines or verify by inspection that the modification was correct. GB agent was released from a disconnected line when a cleanup crew entered the area and tried to clean the equipment.

On May 15, a routine blood analysis for one individual involved in the incident showed a cholinesterase depression (a clinical indicator of exposure) 37 percent below his normal level. Although this level is not considered extremely serious, it is considered significant, and the individual was observed for a period of time at the Tooele medical facility. He did not show any other effects or symptoms of agent exposure.

According to the incident report, the most likely source of the employee's exposure was GB nerve agent released during the incident; however, the exact cause could not be determined.

A second incident occurred on June 23, 1981, when HD mustard agent overflowed on a worker's gloves during agent transfer from a 1-ton container to 1.4-liter shipping bottles. Later, agent again contaminated the worker's gloves when drain lines from the container were removed. The worker decontaminated his gloves after each event and showered before leaving the area. The following day his hands were red and blistered.

According to the incident report, the direct cause was exposure to liquid HD mustard agent while removing protective clothing. Indirect causes included inadequate procedures for (1) completely decontaminating protective clothing, (2) verifying adequate personnel decontamination, and (3) removing protective clothing to prevent contact between bare skin and the suit's outer surface.

The third incident occurred during August 1981 when GB nerve agent vapor triggered an alarm in a furnace building. Personnel observed a mist coming from a hose coupling, put on

protective masks, and evacuated the building. No one experienced injuries or showed symptoms of agent exposure. According to the incident report, agent vapors escaping from the furnace area entered the building and were probably drawn into the furnace exhaust system. The incident report recommended that hoses used in the future be pressure tested before beginning operations, modifications and improvements be made before starting similar operations, and pressure gages be installed on the furnace. All recommendations were implemented.

Pueblo Depot Activity

No accidents or incidents were reported here during the past 5 years.

Lexington-Blue Grass Depot Activity

No chemical incidents were reported here during the past 5 years, but one chemical accident was declared in October 1982. According to the investigation report, three perimeter air-monitoring devices (bubblers) were determined during laboratory analysis to contain a toxic chemical nerve agent. Two of the bubbler readings, although positive, did not exceed acceptable limits established by the Office of the Surgeon General, and the third reading marginally exceeded these limits. There were no agent-related injuries or exposures.

The investigation team conducted an intensive search for the source of bubbler contamination. Review results were consistently negative, however, and it was concluded that the nerve agent contamination did not occur during air monitoring. Focusing their attention on the laboratory operations, the team found that there had been numerous errors in the monitoring and analysis of bubblers. Subsequently, the team determined that the most probable cause of bubbler contamination was one or more unspecified errors in washing or handling in the laboratory.

CONCLUSIONS

We believe the chemical munitions storage sites we reviewed have, and, except as noted, are adhering to, a comprehensive and effective program for assuring the security and safety of the materials in their custody. It appeared that every reasonable effort is being made at the sites to store and secure munitions and agents so as to reduce to a minimum the potential hazards to the safety of people and the environment.

# CHAPTER 3

## RECENT ACTIONS AND FUTURE PLANS CONCERNING THE DEMILITARIZATION OF CHEMICAL MUNITIONS

The current chemical demilitarization (demil) program began in 1969 when the Army reevaluated and terminated its past practice of dumping at sea. The National Academy of Sciences reviewed the problem and recommended that a systematic study of optimal disposal methods be undertaken.

Since 1972 various chemical demil projects have disposed of over 14 million pounds of toxic chemical agents. As of November 1982, there were 776,570 toxic munitions identified for immediate demil (rendering them useless for military purposes), including over 615 leaking munitions which had been containerized for safety. There are currently two operational projects designed to meet this immediate need, the Drill and Transfer System (DATS) and the Chemical Agent Munitions Disposal System.

The Defense Science Board, in its 1980 review of the Chemical Warfare Program, recognized the demil problem as a national issue requiring significant resources. A "Long Range Chemical Demilitarization Concept Study" was subsequently developed by the United States Army Toxic and Hazardous Materials Agency and according to the Deputy Assistant to the Secretary of Defense (Chemical Matters), it could cost as much as $2 billion (in fiscal year 1983 dollars) for disposal of the entire existing stockpile over a 20-year period. To meet future disposal needs, the Army is studying a number of development and long-range projects.

Many questions remain to be answered before the Army will be prepared to undertake a definite, structured approach to demilitarization of chemical munitions and agents. In this regard, the Under Secretary of the Army has requested that the Board on Army Science and Technology undertake a study leading to recommendations for the most effective, economical, and safe means of demilitarizing the existing stockpile of obsolete chemical munitions and recommendations for storing the stockpile in the meantime.

### PAST DEMILITARIZATION ACTIONS

Between November 1973 and July 1982, the Army conducted a number of demilitarization projects at various continental United States and overseas locations. These projects disposed of over 14 million pounds of toxic chemical agents. Quantities disposed of ranged from 200 pounds of agent up to 6,190,400 pounds. Projects involved bulk chemical agents and a variety of bombs. The following table gives some details of these projects.

## Demilitarization Projects Completed Through Fiscal Year 1982

| Project | Location | Completed | Pounds of agent (thousands) |
|---|---|---|---|
| Leaking M55 Rockets | Johnston Island | Nov. 1973 | .2 |
| Bulk Mustard | Rocky Mountain Arsenal (RMA) | Mar. 1974 | 6,190.4 |
| GB in Underground Tanks | RMA | Nov. 1974 | 382.7 |
| Agents in Concrete Drums | Edgewood Arsenal | Aug. 1975 | 32.4 |
| GB in Ton Containers | RMA | Nov. 1975 | 3,604.5 |
| Honest John GB Warheads | RMA | Aug. 1976 | 76.5 |
| M34 GB Cluster Bombs | RMA | Sept. 1976 | 4,129.6 |
| M55 Rocket Residue | Dugway Proving Ground | Sept. 1976 | 53.2 |
| Chemical Bomblets | Dugway Proving Ground | Sept. 1977 | 17.4 |
| Hydrogen Cyanide Bombs | Tooele Army Depot | Nov. 1978 | .3 |
| DATS - Pilot Test | Dugway Proving Ground | Feb. 1980 | a/.3 |
| - Operations | Pine Bluff Arsenal | May 1981 | a/.3 |
| | Anniston Army Depot | July 1982 | a/1.4 |

a/Transferred to shipping containers.

## CURRENT DEMILITARIZATION PROJECTS

The Army has only two demilitarization projects currently operational. These are DATS and CAMDS. DATS is a portable system, while CAMDS is a permanent facility at Tooele Army Depot.

### Drill and Transfer System

DATS is a portable system capable of removing chemical agent from leaking Code H munitions. (Code H refers to unserviceable/unrepairable items and to obsolete munitions.) DATS does not destroy the agent or munition. It merely spearates the two and both must be disposed of by other means. A hole is drilled into the munition, and the agent is drained and transferred to a bulk container.

DATS has been successfully operated at Dugway Proving Ground, Pine Bluff Arsenal, and Anniston Army Depot. In operations at these installations, 62, 39, and 206 items have been emptied, respectively. At the time of our review, DATS was operating at Lexington-Blue Grass Depot Activity. Within the next 2 years, the system is scheduled to be at Umatilla Depot Activity, Pueblo Depot Activity, and Aberdeen Proving Ground to dispose of limited quantities of leaking munitions. Because DATS must be small enough to be moved, its production capability is limited; a production rate of about 6 rounds per shift has been experienced.

### Chemical Agent Munitions Disposal System

CAMDS is a pilot facility at Tooele Army Depot; it began operations in September 1979. It was designed to be capable of disposing of all types of munitions currently in the stockpile. However, due to its limited size and production rates, this facility is not suited to large-scale stockpile disposal. It is suited, however, for testing existing processes before they are used in other demil projects. As of October 1982, over 13,000 GB-filled M55 rockets and 8,000 GB-filled 155-mm. and 105-mm. projectiles had been demilitarized by CAMDS.

## LONG-RANGE DEMILITARIZATION PLANS

The current chemical demilitarization program is a phased effort consisting of (1) those ongoing operational programs discussed previously, (2) planned programs, and (3) a planning and studies effort which includes research and development programs for more cost effective methods of stockpile disposal.

According to USATHAMA, the entire chemical stockpile will eventually have to be disposed of. Currently a requirement exists for demilitarization of condition Code H munitions. All M55 rockets and BZ stocks have been placed into this category. Additionally, as the remaining stockpile items become

unserviceable and/or unrepairable because of continued deterioration or obsolescence, their disposal will become necessary. Public laws prevent disposal at sea and, in the opinion of USATHAMA officials, environmental concerns rule out burial. Construction of industrial demilitarization facilities is the only currently viable alternative, according to USATHAMA officials.

A brief discussion of major long-range demilitarization plans and projects follows. The projects and descriptions were taken from USATHAMA's "Long Range Chemical Demilitarization Concept Study," which was published as a planning document for the use of USATHAMA and does not necessarily identify programs approved for execution by Headquarters, DARCOM, or Headquarters, Department of the Army. The projects do, however, represent USATHAMA's current approach to the chemical demilitarization problem over the next several years.

Chemical Agent Munitions Disposal System

In addition to being an ongoing demil project, CAMDS plays a major role in developmental and long-range plans. CAMDS was designed and constructed in the 1970s and began operations in 1979. Its mission was to further develop proven industrial and military technology and demonstrate its suitability to large-scale demilitarization facilities. A secondary CAMDS mission was to provide a facility for the disposal of the existing Code H munitions (120,000) in storage at the Tooele Army Depot. Tooele was chosen as the site for CAMDS because the most complete array of chemical munitions was in storage there.

After the establishment of the basic CAMDS mission, the Johnston Atoll Chemical Agent Disposal System (JACADS) and the M55 rocket/M23 landmine projects and the research, development, test, and evaluation (RDT&E) program, to be discussed later, added the objectives of using CAMDS to test the technologies that will apply to near-term disposal projects and providing a potential test bed for favorable technologies developed in the future. To support these new high priority requirements, use of CAMDS for the disposal of large quantities of Code H munitions was suspended. CAMDS is planned to be operated in sequential, short periods long enough to evaluate the technologies under investigation in the JACADS, the M55 rocket/M23 landmine disposal, and the RDT&E programs.

BZ disposal project

The Army's entire stockpile inventory of incapacitating agent BZ is located at Pine Bluff Arsenal. This inventory is composed of about 10,700 pounds of bulk agent and another 84,500 pounds of agent which has been blended with pyrotechnic and loaded into two munition systems. These two systems are the M43 cluster bomb and the M44 generator cluster. Both systems were manufactured at the arsenal. In addition, the arsenal has a

considerable amount of BZ-contaminated residues from the original munition-manufacturing facility and from a 1971 storage igloo fire. In all, the arsenal inventory consists of an estimated 637 tons of material to be destroyed or decontaminated.

Disposal of the BZ inventory was assigned to USATHAMA in 1976, when it was determined that not enough data was available to design, build, and operate a BZ demilitarization facility. In 1978, the Army approved a disposal program with four phases: laboratory studies, process development studies, plant acquisition, and finally demilitarization operations. Basic laboratory studies were completed between fiscal years 1978 and 1981. USATHAMA is now designing a BZ plant which can later be modified to dispose of the arsenal's lethal inventory.

Johnston Atoll Chemical Agent Disposal System

The chemical warfare stocks at Johnston Atoll were moved from Okinawa in 1971. The stocks were stored at Johnston Atoll because Public Law 91-672 prohibited returning them to the United States. These stocks have shown the same signs of deteriorating as have U.S. stocks; however, inadequate storage facilities on Johnston Island and the environment of the island have accelerated the deterioration of a portion of these stocks.

The engineering development phase of a project for demilitarizing the Johnston Atoll stocks has been concluded, and preliminary design efforts are underway. Specifically, the Johnston Atoll disposal facility will use modified CAMDS technology, incorporating process and technology improvements that can be developed before startup of the facility. One significant process improvement which will be so incorporated is the use of incineration, in lieu of chemical neutralization, for destruction of nerve agents.

Expedited M55 rocket/M23 landmine disposal project

Quantities of M55 rockets, both VX-filled and GB-filled, are stored at five locations (Tooele Army Depot, Umatilla Depot Activity, Anniston Army Depot, Lexington-Blue Grass Depot Activity, and Pine Bluff Arsenal). These rockets, filled in the 1960s, are exhibiting an accelerated rate of deterioration. They are classified Code H and are of no value to the deterrent chemical munitions stockpile. The rocket deterioration has resulted in increased maintenance costs due to increased surveillance and leaker containment procedures.

M23 landmines containing VX have been included in the expedited M55 rocket demilitarization planning at the request of the Army and the Defense Department. The M23 landmines will be processed, using similar equipment, in the same facility as the M55 rockets. M23 landmines are stored at four of the locations (Umatilla, Tooele, Pine Bluff, and Anniston) where M55 rockets are stored.

The rockets and landmines present a unique demilitarization problem: the explosives cannot be removed before chemical agent operations. Therefore, demilitarization facilities must be capable of withstanding detonation of the explosive components in these items without releasing chemical agent to the atmosphere.

Design of M55 rocket and M23 landmine demilitarization facilities within the next few years will be based primarily on technology included in the CAMDS facility and process improvements currently being evaluated at CAMDS. Any improvements resulting from design of the JACADS facility will also be considered for application, as well as applicable developments from the chemical demilitarization RDT&E program. With respect to building designs and equipment selection and placement, consideration will be given to eventual expansion of M55 rocket and M23 landmine demilitarization facilities for processing other munitions in the stockpile.

Demilitarization technology RDT&E program

To date, chemical demilitarization programs have incorporated proven technology and facilities developed more than a decade ago. Experience in the design, construction, and operation of these facilities and equipment has confirmed a requirement for technology development to improve efficiencies and reduce costs. Innovative efforts to advance the state of the art are required prior to future large-scale chemical demilitarization efforts.

Demilitarization of large stockpile quantities of chemical munitions may require chemical demilitarization facilities up to six times the size of the existing CAMDS prototype. However, it is hoped that development of new technology to support this requirement might significantly decrease total program costs. A technology development program has been proposed to support the stockpile demilitarization requirement. The selection of technologies to be pursued is based on the requirement that the new system be as safe and effective as current CAMDS technology and offer substantial enhancements with respect to safety, reliability, environmental acceptability, capital equipment costs, operating costs, and/or time to completion.

Stockpile disposal program

The USATHAMA stockpile disposal program addresses demilitarization and disposal of the lethal chemical agent stocks which will remain upon completion of the present JACADS and expedited M55 rocket/M23 landmine projects. These stocks will consist of explosive projectiles; nonexplosive projectiles; mortars with all types of agent and in all sizes; and bulk items, such as spray tanks, bombs, and ton containers. Current Army policy is to retain the serviceable chemical stockpile. However, this disposal project was established to provide the budget and schedule information necessary for long-range planning.

The USATHAMA stockpile program currently calls for developing a recommended concept for stockpile disposal by fiscal year 1985. This concept would incorporate the results of the RDT&E program; experience derived from the CAMDS, JACADS, and expedited M55 rocket/M23 landmine projects; and the results of a number of additional studies which must be conducted in order to address issues affecting future stockpile disposal concepts. Included in these other studies are surveys of current storage sites to consider future development of either storage site or regional disposal facilities, movement studies addressing the technical and political feasibility of collocation of the stockpile to regional facilities, and cost benefit analyses of competing alternatives.

## COMPREHENSIVE ASSESSMENT OF PROBLEMS INVOLVED IN DEMILITARIZING OBSOLETE CHEMICAL MUNITIONS AND AGENTS TO BE UNDERTAKEN BY THE ARMY

The Under Secretary of the Army has asked the Board on Army Science and Technology to undertake a study leading to recommendations for the most effective, economical, and safe means of demilitarizing the existing stockpile of obsolete chemical munitions, and recommendations for storing the stockpile in the meantime. Specifically, the Board has been asked to assess the probabilities and consequences of events posing risks to public health and safety, or to property, and to recommend priorities for disposal and/or commercial use. The study, which had not officially begun at the time of our review, was expected to take about 10 months.

In spite of the need for new disposal technologies, decisions are being made on the initial phases of the demilitarization program, as previously discussed. However, planning is complicated because the Army does not have a comprehensive assessment of the problems involved, including the risk of holding existing obsolete stocks while improved disposal technologies are being developed. Demilitarization of obsolete chemical munitions and agents has been studied previously. However, no analysis has been made to determine (1) the order in which chemical weapons should be demilitarized, (2) whether the Army can afford to wait for improved technology for use in the demilitarization, and (3) whether such weapons should be destroyed in place or moved to centralized disposal facilities.

As part of its study, the Board has been asked to assess the risks associated with the disposal of existing stocks of obsolete chemical agents and munitions at the eight U.S. storage sites. The assessment is to have three principal objectives:

1. Assess and balance the probability and the consequences to public health of an accident or incident involving any stockpile component or location. This assessment will not be quantitative. It will show the level of

risk in a qualitative sense of high, medium, and low probability. The consequences will be discussed in terms of these levels of probability.

2. Evaluate the urgency of demil for each component and location, especially in terms of the rate of stockpile deterioration in relation to increasing public health danger. For example, a determination is expected of whether the Army can afford to wait for more effective technology or should it proceed with what is available.

3. Assess the available technology relevant to the demil process and assess the current and planned demil programs. On this basis, suggest alternative promising approaches that should be investigated prior to committing large-scale resources to current methods and technologies. Consideration shall be given to the requirements for timely disposition of the stockpile.

The anticipated results of the Board's assessment will (1) show the potential hazards and risks to public health and safety associated with different demil options, including no activity, (2) identify technological options which may significantly decrease the cost of demil in relation to current technology, (3) identify and characterize each weapon system and give priority of disposal on the basis of the danger posed to public health and safety, and (4) identify and characterize the nature of the demil waste products and indicate options for their disposal and/or use in commercial applications.

## CHAPTER 4

## OTHER MATTERS RELATED TO THE CHEMICAL MUNITIONS STOCKPILE

We were also asked to provide information on certain matters "related" to the security and safety of chemical munitions storage, including:

--Rationale for current storage locations.

--Barriers to storage consolidation.

--Plans for moving chemical munitions.

--Contracting out for security guards.

We found that most munitions are still stored where adequate storage space was available when they were manufactured. Movement from one location to another, for purposes of consolidation or demilitarization, is greatly hampered by existing law. Presently there are no plans for large-scale movements of chemical munitions or agents. Although there is no official Army position on contracting for security guard service at chemical storage sites, except as imposed by law, storage site officials are generally opposed to the idea.

### RATIONALE FOR CURRENT STORAGE LOCATIONS

Most of the toxic chemical munitions and bulk agent stockpile is stored at the eight locations in the United States discussed previously. According to Army officials, there is not an "official position" on the rationale for these storage sites. However, they explained the circumstances which have determined, in their opinion, the present storage locations of the stockpile inventory.

Before 1970, chemical munitions were considered part of the conventional ammunition inventory and, as such, were subject to fewer restrictions on transportation, disposal, demilitarization, and security. Under these conditions, chemical and conventional munitions were collocated at numerous storage activities. Other chemical munitions were being stored where they were assembled and/or manufactured, such as Newport Army Ammunition Plant and Pine Bluff Arsenal.

In 1970, because of the restrictions of Army regulations and Public Law 91-121, Armed Forces Appropriation Act of 1970, it became necessary to isolate chemical munitions. Since the potential hazard to the public was, and still is, a primary consideration, one of the initial areas addressed in the legislation was restrictive transportation requirements. Once imposed, these requirements made any routine movement of toxic chemical munitions impractical because of the sensitive nature

of the material and the greatly increased costs. Even relatively small moves now require extensive planning, coordination, and approval. For the isolation requirement discussed above, most munitions did not have to be moved to another installation. Instead, they were moved to a chemical exclusion area at their existing location.

## MOVEMENT AND COLLOCATION OF CHEMICAL MUNITIONS

Public Law 91-121 specifies requirements which must be met before funds can be used to transport chemical warfare material. Included is a requirement for submitting movement plans to the Department of Health and Human Services for review and comment. The Department's recommendations must be implemented, unless the President determines that national security is an overriding consideration.

### Past movements

Movements have been succesfully accomplished in the past, despite considerable public concern over possible hazards associated with the potential for accidents during movement. Past movements include operation CHASE (collocation of chemical material by rail for ocean disposal), Operation DTS (Dugway to Tooele South), SETCON I and II (collocation of Chemical Agent Identification Sets), and the movement of Weteye bombs from Colorado to Utah. Operations CHASE and DTS involved solely surface movement, while the two SETCON operations and the Weteye movement were accomplished using air transport. Operation CHASE was conducted before Public Law 91-121 was passed. We were told that there are no immediate plans for any additional large-scale movements of chemical munitions.

### Potential constraints to movement and collocation

Large-scale movement of chemical warfare material is not routine. Army regulations require extensive planning prior to initiating such moves. Documentation requirements include preparation of an environmental impact statement, an operations plan, a movement plan, and operating procedures, as well as notification of the Congress. Potential special movement requirements and considerations which according to Army officials might be applicable, depending on circumstances, are discussed below.

--It is possible that 100-percent surveillance for leakage of the stockpile to be collocated would be required before any movement took place.

--Special precautions may be necessary when handling Code H items. There may be a need for a capability to immediately demilitarize or overpack leakers, should they be discovered.

--The support efforts needed for a movement are substantial. There are requirements for command and control, technical escort, response teams, decontamination equipment, medical personnel, additional ground transport and material handling, and transport vehicles. Additionally, there may be meteorological/time restrictions on such movements, especially if air transport is used.

--Many problems associated with moving chemical munitions political. The Weteye movement from Colorado to Utah illustrated these problems. Plans to move this material were abandoned several times for various reasons. The Congress had to mandate the movement before operations could begin. Congressional action would probably be necessary prior to any future large-scale stockpile movement. Scrutiny of movement plans by agencies outside the Army would include review by the Department of Health and Human Services in accordance with Public Law 91-121.

--Movement of chemical warfare material is a highly sensitive option because the movement could be jeopardized by increased public concern and political pressure. For example, court injunctions could stop planned movements at the last moment.

--Adequate storage facilities must be available. Movement and collocation would necessitate construction of many additional storage magazines at a consolidation site since availability of igloos for storing chemical munitions in accordance with Army Regulation 50-6 is limited.

## CONTRACTING FOR SECURITY GUARD SERVICE

Public Law 97-252, Department of Defense Authorization Act, 1983, section 1111, states:

> "None of the funds appropriated pursuant to an authorization contained in this Act may be obligated or expended to enter into any contract for the performance of fire-fighting functions or security-guard functions at any military installation or facility, except when such funds are for the purpose of providing for the renewal of contracts in effect on the date of the enactment of this Act."

Although this Public Law currently prohibits contracting for security guards, we were asked to explore the issue at chemical munitions storage sites from a quality of service standpoint. We asked officials in the Nuclear/Chemical Directorate, Headquarters, Department of the Army; Nuclear/Chemical Office, Headquarters, DARCOM; the Security Office, DARCOM; the Office of Army Law Enforcement, Headquarters, Department of the Army; and security officials at each installation visited how contracting for security guard service would or could affect the security of chemical munitions. None of these officials could provide an

official Department of Defense or Department of the Army position as to why security guard service should not be contracted out (except for the restriction of the Public Law).

However, most of the individuals did have personal/professional opinions as to why they would prefer not having contract guards. These opinions were best expressed in our discussions with the chief of the Security Division at Tooele Army Depot. He enumerated the following problems.

--A commander would lose the ability to directly influence the quality, performance, and responsiveness of the security guards.

--Dual staffing would be required for several months to insure continuity and adequate security for chemical surety material. A contractor would need this time to provide the specialized training and background checks required for a fully trained, equipped, and professional security force.

--A contractor's first priority would be to make a profit and, therefore, would probably meet only minimum contract requirements.

--Several liability issues appear to be involved in contractor guards carrying firearms and using deadly force to prevent theft or destruction of chemical surety material.

--There could be an adverse impact on working relationships and mutual support and assistance agreements with local law enforcement agencies as well as a possible loss of public confidence.

--Noncontract security personnel would still be needed to perform intelligence, investigations, and planning functions and to monitor the contractor.

Although we did not explore the validity of these concerns, they were related to us by many of the officials we interviewed.

# DESCRIPTION OF CHEMICAL AGENTS

## MUSTARD AGENTS

Mustard agent, first used in World War I, is classified as a blistering agent. The two types, HD and HT, are quite similar. The effects of exposure to a mustard agent are insidious because symptoms do not appear immediately. The initial symptom of skin exposure to mustard agent is skin reddening similar to sunburn. Except with very mild exposure, the reddening progresses to blistering and tissue destruction. Inhaling mustard vapor damages mucous membranes of the respiratory tract; severe exposures increase the risk of pneumonia and other respiratory infections. The effects of mustard are also cumulative; repeated exposure to small dosages can cause severe respiratory symptoms.

## NERVE AGENTS

The nerve agents GB and VX are rapid acting and highly lethal. Liquid GB vaporizes and dissipates readily and is classified as a nonpersistent agent, while VX may persist in liquid form for several days. Both GB and VX disrupt the central nervous system by inactivating an enzyme important to the transmission of nerve impulses. Heavy exposure usually cause death by asphyxiation. The agents can be either inhaled as a vapor or absorbed through the skin as a liquid. Since GB vaporizes more readily, the primary hazard of GB is vapor inhalation; the primary hazard of VX is absorption through the skin.

## INCAPACITATING AGENT

The psychoactive compound BZ was not developed for lethal effects, but to prevent exposed personnel from effectively performing their missions for an extended period. The first noticeable symptoms of exposure include increased breathing and heart rate and dilation of the pupils. At higher dosages, motor coordination becomes impaired, the individual becomes confused; apprehensive; and, finally, stuporous. Incapacitation may last almost 2 days, and some effects may persist even longer. While recovery from BZ exposures is gradual, it is apparently complete, with no residual effects.

Pure BZ is a white powder and is classified as persistent because it decomposes slowly. For military use, BZ is mixed with a pyrotechnic compound which, when ignited, produces an aerosol cloud of agent dust. Inhaling this aerosol is the primary hazard of BZ. Some research, however, indicates that personnel frequently working with BZ may absorb the agent through the skin.

APPENDIX II

## DEFINITION OF CHEMICAL ACCIDENT/INCIDENT

Army Regulation 50-6 defines a military chemical "accident" as

"Any situation involving chemical surety materiel which results in:

"a. Exposure of personnel to a chemical agent that causes injury to personnel or exhibition of physiological symptoms requiring more than standard first aid procedures or results in a lost workday (days away from work).

"b. Chemical agent hazards off post.

"c. Property damage of $10,000 or more.

"d. An unintentional or uncontrolled release of a chemical agent where the agent quantity released to the atmosphere is such that a serious potential from exposure is created by exceeding the applicable maximum allowable agent concentration-time levels for exposure of unprotected personnel.

"e. A production interruption exceeding 24 hours, unless voluntarily interrupted pending the outcome of an investigation into the cause.

"f. Significantly degraded operational capability.

"g. Or may result in unusual interest by the public news media."

The same regulation defines a military chemical "incident" as

"Any situation involving chemical surety materiel which results in:

"a. Exposure of personnel to a chemical agent that results in lost workdays (restricted work activity) or the need for standard first aid treatment.

"b. Release of a chemical agent without exposure of personnel which is not reported as a minor leak or an accident.

"c. Property damage of a least $250 and less than $10,000.

"d. Actual or suspected loss or actual or attempted theft or diversion of chemical surety materiel.

"e. Actual or attempted penetration of a chemical exclusion area."

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